

N^o 14,508



A.D. 1892

Date of Application, 11th Aug., 1892

Complete Specification Left, 9th May, 1893—Accepted, 24th June, 1893

PROVISIONAL SPECIFICATION.

Improvements in Dental and other Chairs, and in Lifting and Lowering Apparatus applicable to the same.

We, THOMAS HARRY GARDNER and EDWARD GARDNER both of Hadfield Street, Cornbrook, Manchester, Engineers, do hereby declare the nature of this invention to be as follows :—

In the dental chair to which the invention is applicable, there is a fixed chair
5 standard ; an intermediate moving part sliding on the fixed standard up and down ; and an upper moving part sliding upon the intermediate part and carrying the chair seat.

These three parts are so geared by racks and pinions that for every increment of
rise given to the intermediate part, the upper part rises a corresponding increment
10 in relation to the intermediate part. Consequently in relation to the fixed standard the upper moving part rises and falls twice as fast as the intermediate moving part.

The improved lifting apparatus is arranged as follows :—On a spindle mounted
on the intermediate part and carrying pinions gearing into racks on the other parts
15 is fixed a silent clutch worked by a tread lever so that as the lever is depressed the spindle is turned and so raises the chair. One end of a controlling arm is fixed loosely on the spindle, the other end is slotted and rides loosely on a pin fixed on the upper moving part of the chair. In the periphery of the clutch case which
also is loose upon the spindle is fixed a projection which normally is held by a spiral
20 spring hard down on a similar projection on the controlling arm. The tread lever and the controlling arm project on opposite sides of the spindle and when the extremity of the controlling arm is raised by its connection with the upper moving part, the extremity of the tread lever is depressed. Thus the tread lever is
arranged to stand ready for use with its foot end always at the same distance from
25 the ground.

The silent clutch consists of a disc rigidly connected with the spindle and is enclosed in the clutch case. The case at one part of its circumference is slotted through to the inside and receives a tongue which is pivotted in the case. The tread lever is attached by a joint to the tongue and when the tongue is depressed
30 by the lever it presses on the disc. One end of a helical spring connects a boss on the clutch case with the tread lever. When the tread lever is depressed the tongue presses against the periphery of the disc causing sufficient friction to carry the disc and spindle round.

When the tread lever is lifted by the spring the tongue ceases to touch the disc
35 thus leaving the chair free to be lowered.

The lowering is effected by improved lowering apparatus.

A spindle is provided and is geared with the spindle before referred to. This spindle through a worm drives an axis and the worm is so proportioned that it will just turn and permit the load to descend unless restrained. Upon the axis there is
40 a flanged disc and concentric with this is a stationary disc, the flange and the stationary disc being in the same plane.

Two levers are pivotted to the flanged disc. The levers at the pivot ends are so shaped as to embrace a portion of the periphery of the disc in such a manner that one or other end of the arc of embrace on the levers presses on to the disc rim
45 according as the lever arms are pulled away from or pressed towards the centre a spring on each lever presses the levers towards the axis and they act after the manner of a brake sufficiently to prevent the axis from revolving under the load.

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The action is as follows :—When the chair is to be lowered the flanged disc is started to revolve and if sufficient impetus be given the levers under the action of centrifugal force fly outwards against the action of the springs and cease to press on the disc. The speed then accelerates and the levers begin to press on the edge of the disc at the other end of the arc of embrace. When a certain speed is reached 5 the pressure due to centrifugal force prevents further acceleration and the descent continues at a uniform rate. The levers thus govern the rate of descent.

We have devised an improved method of adjusting the swinging back of the chair. A horizontal bar swivelling on centres in the intermediate moving part of the chair is provided. It is recessed to receive a taper bar or rod and a wedge 10 piece. The bar or rod is jointed at its upper end to the swinging back.

The wedge is provided with a pivot which is received in the fork end of a foot lever which lever is pivotted at the middle of its length in the horizontal bar. A spring acts on the fork end of the lever so as to continually press the wedge 15 downwards.

To depress the back the lever is depressed at the foot end which action lifts the wedge, the back then is pulled down to the point required. When the lever is released the back is then locked. When it is desired to raise the back it is pressed forward to the point required and the wedge automatically locks it in any 20 position.

Dated this 11th day of August 1892.

CARPMAEL & Co.,
Agents.

COMPLETE SPECIFICATION.

Improvements in Dental and other Chairs, and in Lifting and 25
Lowering Apparatus applicable to the same.

We, THOMAS HARRY GARDNER and EDWARD GARDNER both of Hadfield Street, Cornbrook, Manchester, Engineers, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly 30 described and ascertained in and by the following statement :—

In the dental chair to which the invention is applicable there is a fixed chair standard, an intermediate moving part sliding on the fixed standard up and down, and an upper moving part sliding upon the intermediate part and carrying the chair seat.

The chair seat is raised by the aid of a foot lever which is carried upon the 35 intermediate moving part but is nevertheless so arranged that the tread to which the foot is applied remains at approximately the same distance from the ground.

The parts are retained in any position to which the seat may have been raised by a frictional brake. The brake pieces are mounted upon a hand wheel which is geared with the parts to be retained by means of a worm wheel and worm of rapid 40 pitch. The brake pieces press upon a stationary cylindrical surface concentric with the hand wheel. When the wheel is rotated centrifugal force by overcoming springs withdraws the brake pieces from the disc and the descent of the weight is permitted.

When a certain speed is exceeded the centrifugal force operates to again apply 45 the brake pieces and so the velocity of descent is regulated.

The height of the chair back or head rest is regulated by means of a taper strut or support which connects the back or head with a horizontal bar pivotted to the chair frame. The strut lies in a groove formed for it in the bar and a wedge locks it therein so as to prevent downward movement but permitting it to be raised. By 50 means of a foot lever the wedge can be withdrawn.

Figure 1 of the annexed drawings is a side elevation of a dental chair constructed in accordance with our invention. The seat in this figure is represented in its lower position.

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Figure 2 is a side elevation of the same chair with the seat in its raised position ; the back of the chair is not represented in this figure.

Figure 2^A is a rear elevation and Figure 2^B is a horizontal section of a portion.

Figure 3 is a side elevation of the lifting gear to a larger scale.

5 Figure 4 is a plan partly in section of the lifting gear and Figure 5 is a sectional elevation of a portion of the same.

Figures 6 and 7 are sectional views of parts of the lowering gear.

Figure 8 is a rear elevation of apparatus for the adjustment of the back of the chair.

10 Figure 9 is a plan partly in section of the parts shewn by Figure 8.

In the dental chair to which the invention is applicable,

A is the fixed chair standard ;

B is the intermediate standard or moving part sliding on the fixed standard up and down ; and

15 C is the upper moving part sliding upon the intermediate part and carrying the chair seat.

These three parts are so geared by racks and pinions that for every increment of rise given to B the intermediate part, the upper part C rises a corresponding increment in relation to the intermediate part. Consequently in relation to the fixed standard
20 the upper moving part C rises and falls twice as fast as the intermediate moving part B.

The improved lifting apparatus is arranged as follows :—On a spindle D mounted on the intermediate part and carrying pinions gearing into racks on the other parts A and C is fixed a silent clutch worked by a tread lever E. As the lever is
25 made to incline the spindle is turned and the chair is raised. One end of a controlling arm F is fixed loosely on the spindle D, the other end is slotted and rides loosely on a pin G fixed on the upper moving part C of the chair. This pin controls the angular motion of lever F round the spindle D. In the periphery of the clutch case *a* which also is loose upon the spindle is fixed a projection *b* which
30 normally is held by a spiral spring hard down on a similar projection *c* on the controlling arm. The tread lever E and the controlling arm F project from opposite sides of the spindle D and when the extremity of the controlling arm is raised by its connection with the upper moving part C the extremity of the tread lever is depressed. Thus the tread lever is arranged to stand ready for use with its foot
35 end always at the same distance from the ground.

The silent clutch consists of a disc *d* rigidly connected with the spindle D and is enclosed in the clutch case *a*. The case at one part of its circumference is slotted through to the inside and receives a tongue *e* which is pivotted in the case at *f*. The tread lever E is attached by a joint to the tongue *e*. When the tread lever is
40 depressed the tongue *e* presses against the periphery of the disc *d* causing sufficient friction to carry the disc and spindle round. *h* is a coiled spring connecting *m* on the case *a* with *n* on the tongue *e*. When the tread lever is lifted by the spring *h* the tongue ceases to touch the disc thus leaving the chair free to be lowered. When the tread lever E is depressed the spring *h* stretches, the tongue touches the
45 disc at *l* and so begins to grip the disc.

Thus during the downward movement of the lever E the tongue *e* locks the case *a* and the disc *d* fast together. In the upward movement, when the lever E is raised by the springs, the case *a* turns about the axis D, whilst the axis and the disc *d* remain at rest, being held by the lowering apparatus which we will now describe.

50 The lowering is effected by improved lowering apparatus.

A spindle H is provided. The spindle D through a worm wheel and worm and ratchet drives the axis H and the worm is so proportioned that it will just turn and permit the load to descend unless restrained.

Upon the axis there is a flanged disc J and concentric with this is a stationary
55 disc K the flange and the stationary disc being in the same plane.

Two levers L and L are pivotted to the flanged disc J at M M.

The levers at the pivot ends are so shaped as to embrace a portion of the

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periphery of the disc in such a manner that one or other end of the arc of embrace on the levers presses on to the disc rim according as the lever arms are pulled away from or pressed towards the centre. A spring N on each lever presses the levers towards the axis H and they act after the manner of a brake sufficiently to prevent the axis from revolving under the load. 5

The action is as follows :—When the chair is to be lowered the flanged disc J is started to revolve and if sufficient impetus be given the levers L, L, under the action of centrifugal force fly outwards against the action of the springs N and cease to press on the disc. The speed then accelerates and the levers begin to press on the edge of the disc at the other end of the arc of embrace. When a certain 10 speed is reached the pressure due to centrifugal force prevents further acceleration and the descent continues at a uniform rate. The levers thus govern the rate of descent.

We have devised an improved method of adjusting the swinging back of the chair. A horizontal bar Z swivelling on centres in the part C of the chair is 15 provided. It is recessed to receive a taper bar or rod Y and a wedge piece X. The bar or rod Y is jointed at its upper end to the swinging back W.

The wedge is provided with a pivot *w* which is received in the fork end of a lever U which lever is pivotted at the middle of its length at *x* in the horizontal bar Z. A spring (not shewn in the drawing) acts on the fork end of the lever U 20 so as to continually press the wedge downwards.

To lower the back W the lever U is depressed at the foot end which action lifts the wedge, the back then is pulled down to the point required. When the lever is released the back is then locked. When it is desired to raise the back it is pressed forward to the point required and the wedge automatically locks it in any 25 position.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. The combination consisting of the parts A B and C geared together by racks 30 and pinions ; a disc *d* fast on an axis D which turns with the pinions and which axis is carried upon the intermediate part B, silent pawl gear and foot lever turning about the axis, a stop controlled by the upper moving part C and a spring or its equivalent operating upon the pawl gear and tending to raise the foot lever as far as the controlled stop admits ; the whole so arranged that notwithstanding 35 the movement of the part B the position of the outer end of the foot lever varies but little.

2. The retaining and lowering gear consisting of an axis H geared with the part to be raised or lowered ; a wheel J fast upon the axis ; weighted brake pieces L pivotted upon the wheel ; springs N operating upon the brake pieces ; and a 40 stationary cylindrical surface K ; the whole so arranged that when the wheel J is at rest the springs hold the brake pieces against the discs and when in motion the centrifugal force first overcomes the springs and when a certain speed is attained again brings the brake pieces into contact.

3. Retaining and lowering apparatus consisting of a wheel J suitably geared 45 with the weight to be controlled ; weighted brake pieces mounted on the wheel springs N pressing the brake pieces inwards towards the centre and a stationary surface K upon which the brake pieces may bear ; the whole so arranged that the springs hold the brake pieces against the surface K with sufficient force to retain the load whilst nevertheless allowing the wheel to be turned by hand and also so 50 that when the wheel attains a certain speed the centrifugal action upon the brake pieces first overcomes the springs and afterwards at a higher speed again brings the brake pieces into contact with the stationary surface.

4. The mechanism for adjusting the chair back consisting of the tapered strut Y jointed to the back ; the cross bar Z ; the wedge X which with the strut Y passes 55 through an inclined recess in the bar Z and the lever U for lifting the wedge ; the

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whole so arranged that the taper of the strut and wedge when the tendency is downwards locks the parts until the wedge is withdrawn but when the tendency is upwards allows the strut to be raised.

Dated this 19th day of April 1893.

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T. H. GARDNER.
EDWARD GARDNER.

London : Printed for Her Majesty's Stationery Office, by Darling & Son, Ltd.—1893



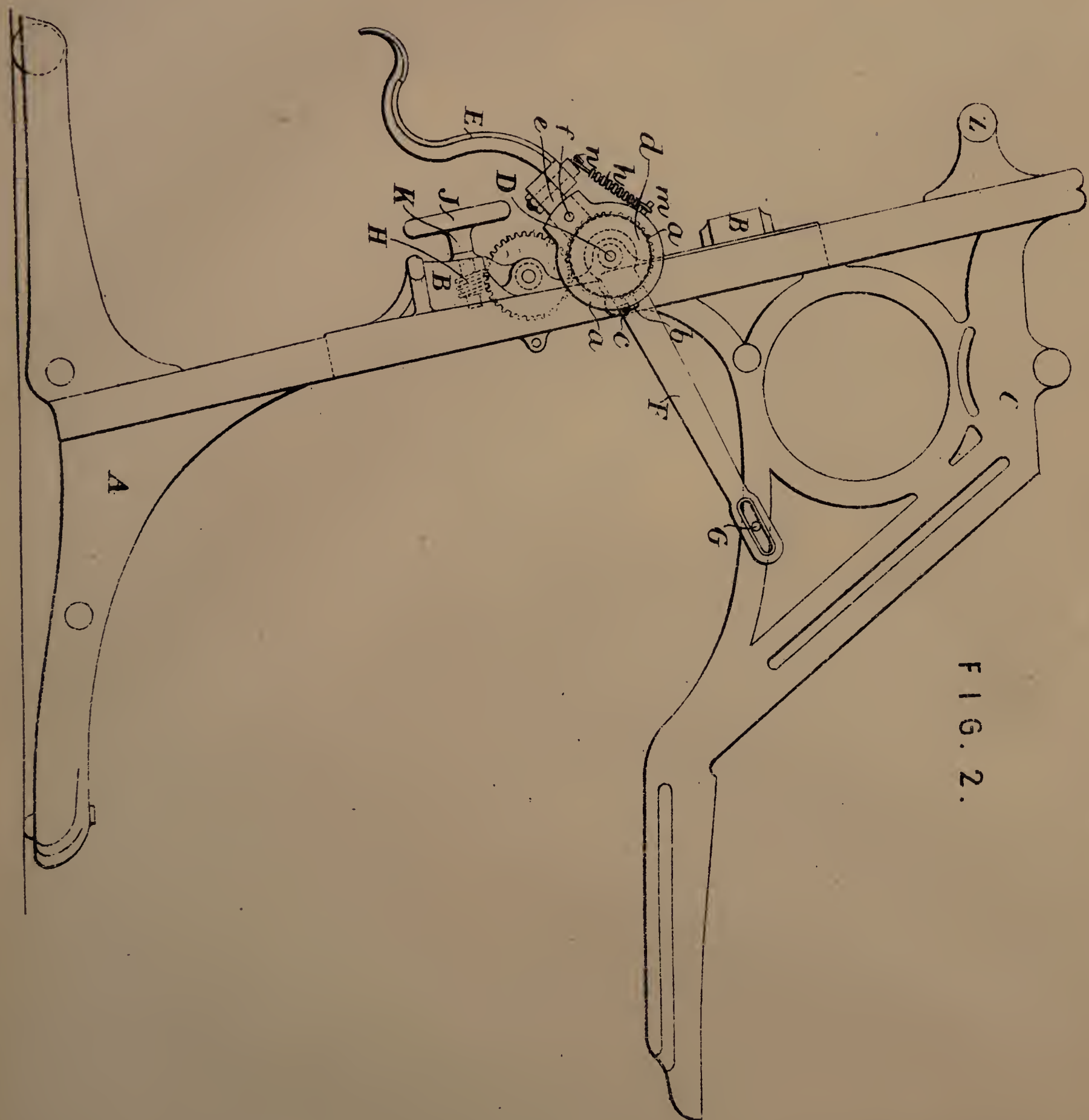


FIG. 2.

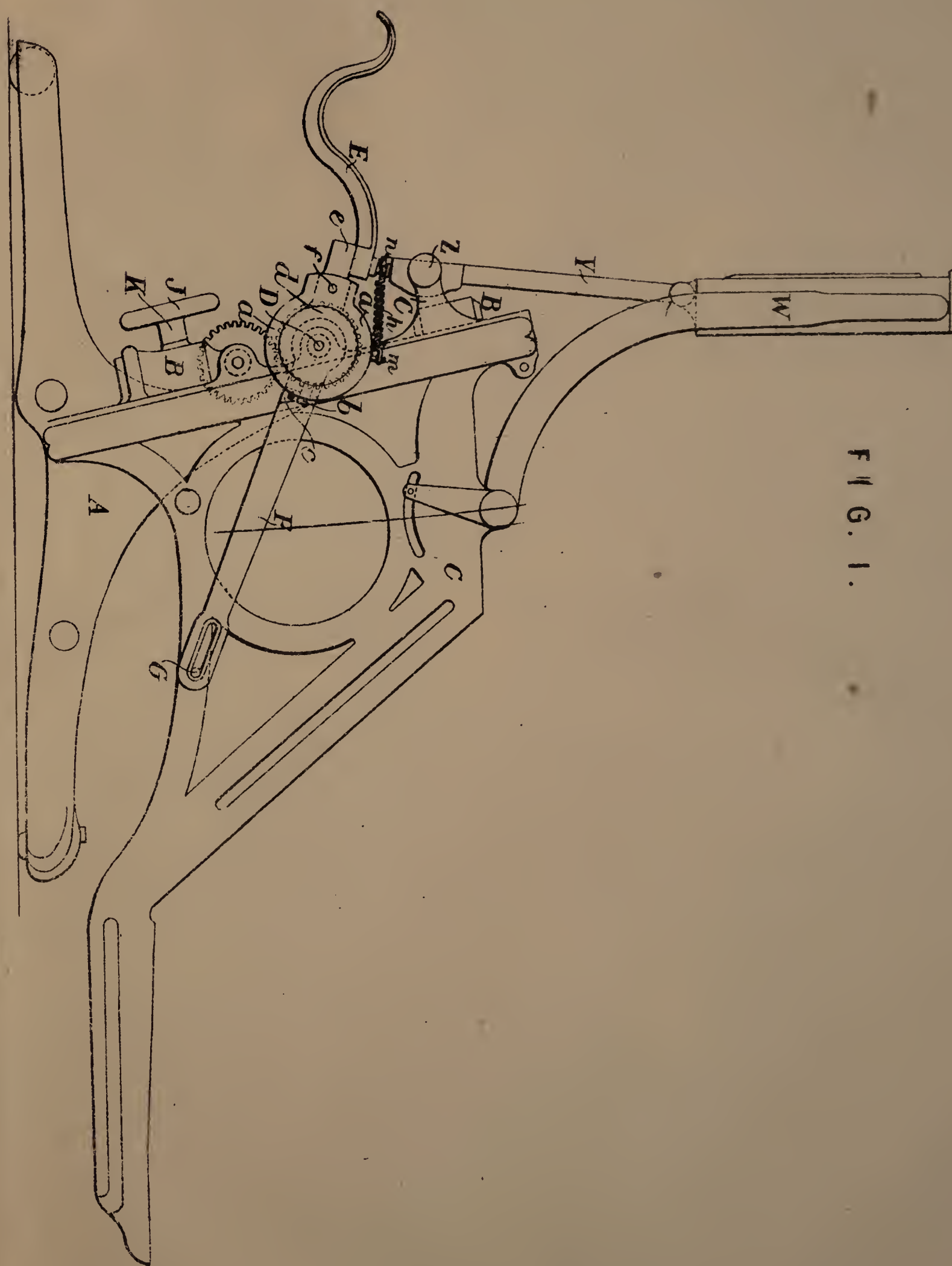


FIG. 1.

FIG. 2^a

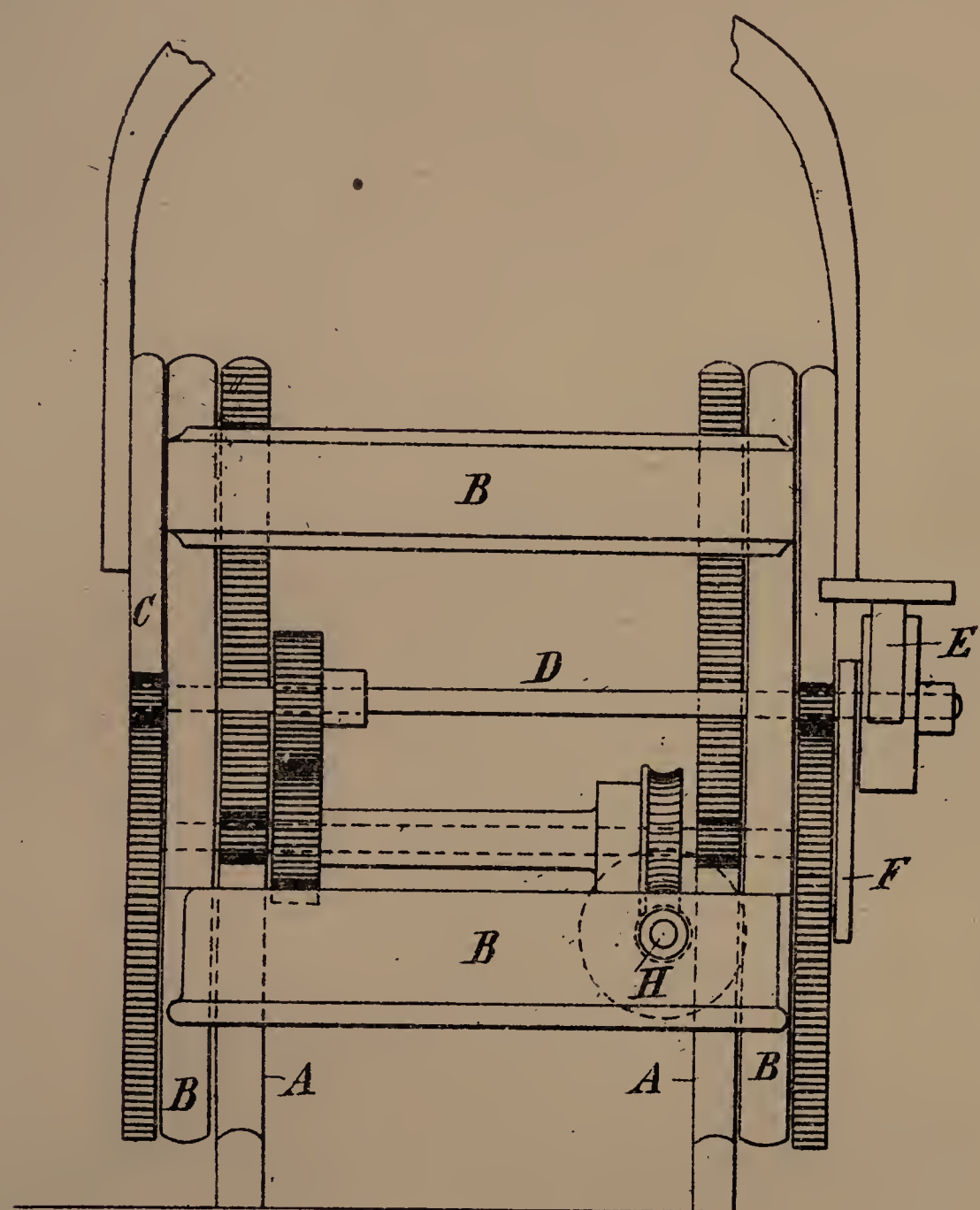


FIG. 2^b

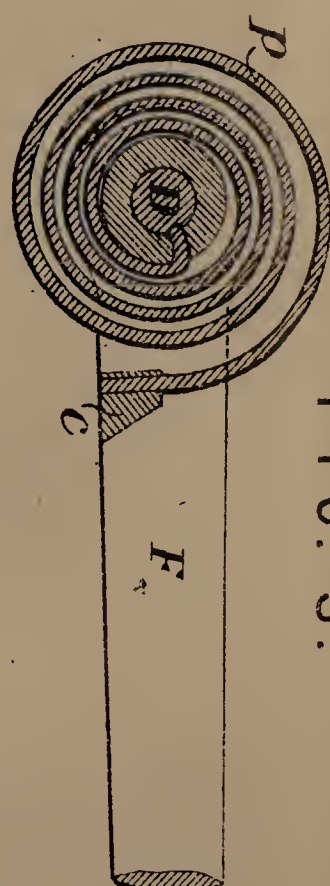
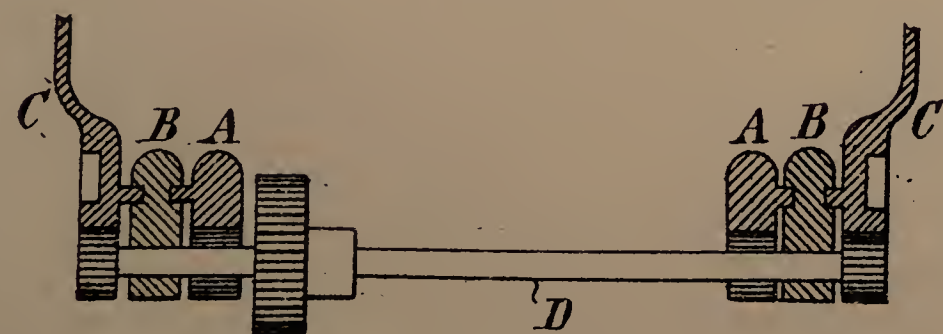


FIG. 5.

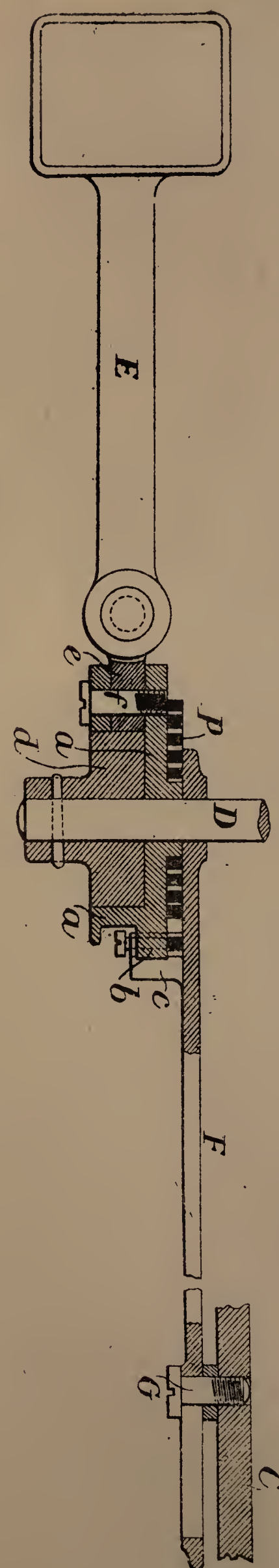


FIG. 4.

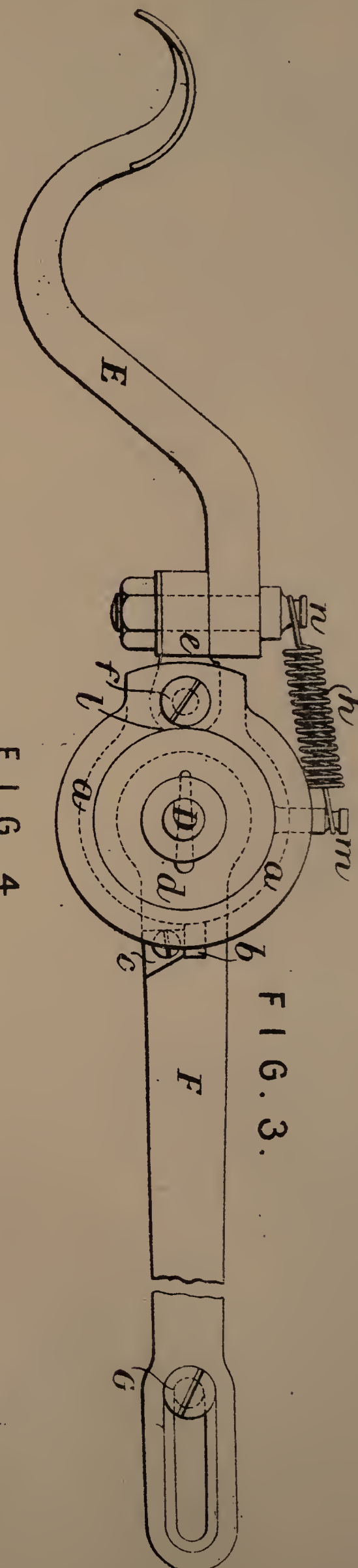


FIG. 3.

[This Drawing is a reproduction of the Original on a reduced scale.]

[This Drawing is a reproduction of the Original on a reduced scale]

FIG. 8.

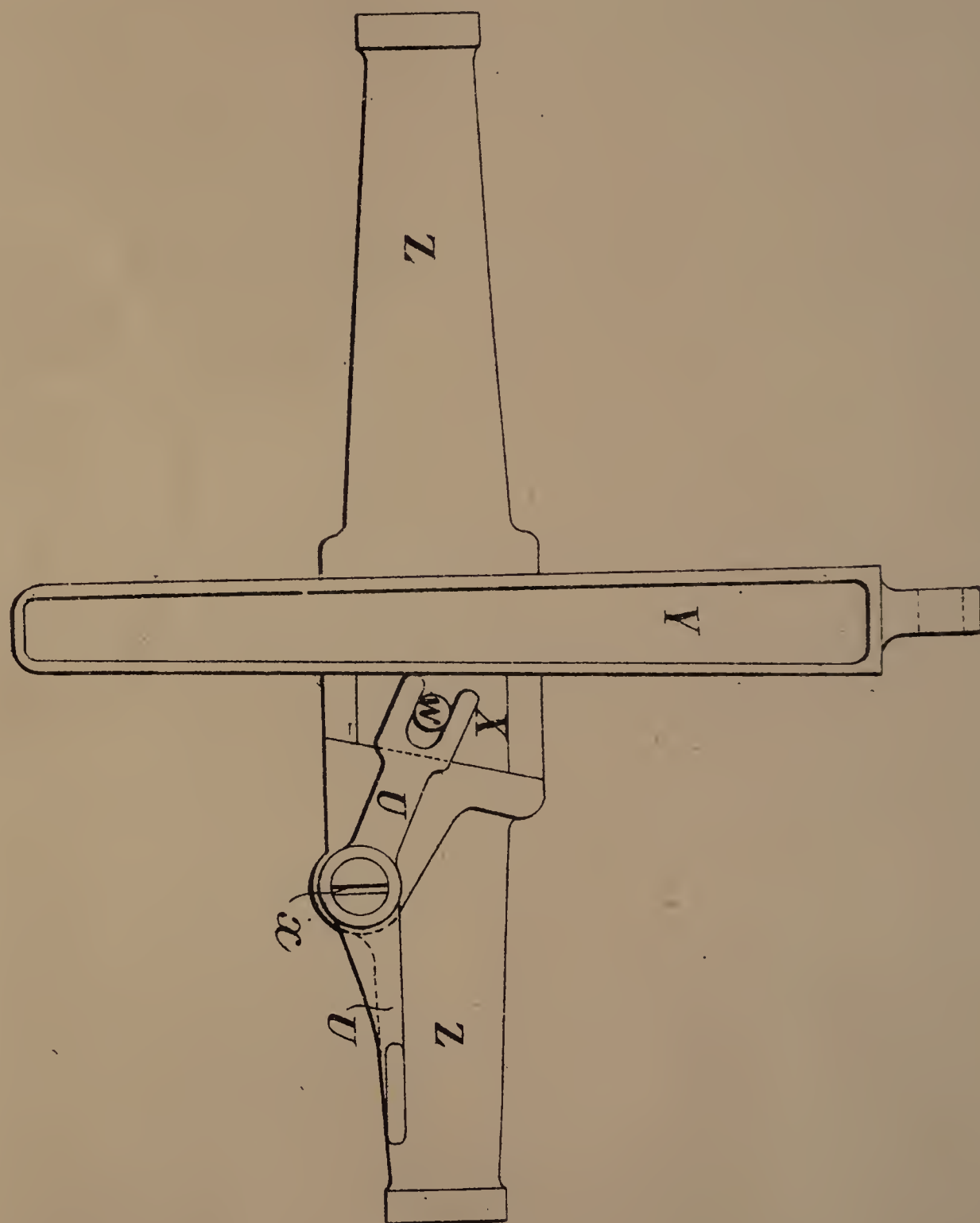


FIG. 9.

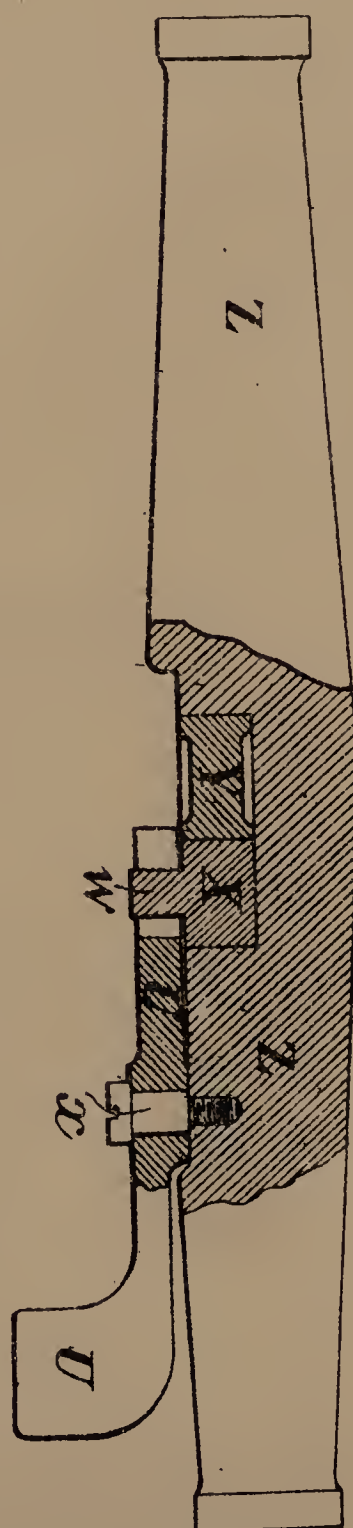


FIG. 6.

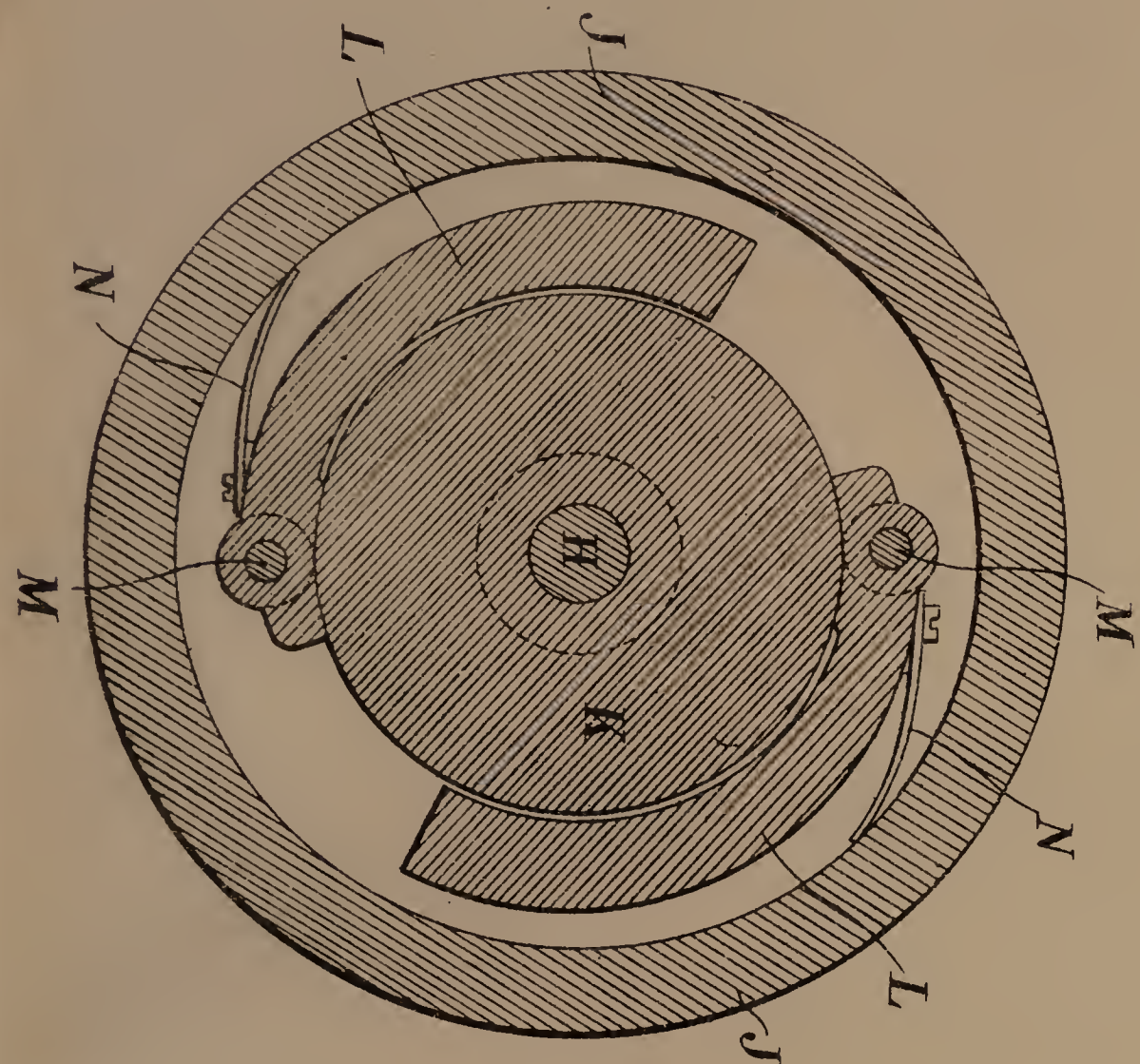


FIG. 7.

